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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of **Young**  
Serial No.: **10/084,723**  
Filed: **2/25/2002**  
Title: **MATRIX ARRAY DEVICES WITH FLEXIBLE SUBSTRATES**

Atty. Docket No.: **GB 010051**  
Group Art Unit: **2826**  
Examiner: **Mandala, Victor A**

Commissioner for Patents  
Alexandria, VA 22313-1450

Sir:

Enclosed is an original plus two copies of an Appeal Brief in the above-identified application.

☒ A credit card authorization in the amount of **\$330** is enclosed.

☐ The Commissioner has already been authorized to charge fees in this application to Deposit Account .

☐ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account \_\_\_\_\_. Enclosed is a copy of this sheet.

Respectfully submitted,

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CERTIFICATE OF MAILING

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On 4 November 2003

By R M McDermott



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of **Young**

Serial No.: **10/084,723**

Filed: **25-Feb-2002**

Title: **MATRIX ARRAY DEVICES WITH FLEXIBLE SUBSTRATES**

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Examiner: **Mandala, Victor A**

**APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192**

Commissioner for Patents  
Alexandria, VA 22313-1450

Sir:

This is an appeal from the decision of the Examiner dated 4 June 2003, finally rejecting claims 1-15 of the subject application.

**I. REAL PARTY IN INTEREST**

The above-identified application is assigned, in its entirety, to Koninklijke Philips Electronics, N.V., The Netherlands.

**II. RELATED APPEALS AND INTERFERENCES**

Appellant is not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have any bearing on the Board's decision in the pending appeal.

**III. STATUS OF CLAIMS**

Claims 1-15 are pending in the application. Claims 1-3, 6, 8-11, and 13 stand rejected by the Examiner under 35 U.S.C. 102(e), and claims 4, 5, 7, and 12 stand rejected by the Examiner under 35 U.S.C. 103(a).

**IV. STATUS OF AMENDMENTS**

No amendments were filed subsequent to the final rejection in the Office Action dated 4 June 2003.

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## **V. SUMMARY OF THE INVENTION**

The invention comprises a flexible or curved display device that includes semiconductor devices and pixel electrodes on a substrate. The semiconductor devices 12 and the pixel electrodes 18 are arranged on the substrate 20 to each occupy distinguishable first areas and second areas on the substrate (Applicant's FIG. 3). The substrate is structured relative to these first areas and second areas such that flexing or curvature of the substrate occurs more readily at the areas of the substrate where the pixel electrodes 18 are located, compared to the areas of the substrate where the semiconductor devices 12 are located (Applicant's page 3, lines 9-15).

The controlled flexing is achieved, for example, by thinning 50 or otherwise weakening the substrate 20 beneath the pixel electrode 18 areas (Applicant's FIGs. 3 and 4, and page 7, line 17 through page 8, line 12). Thickening 60 or otherwise strengthening the substrate 20 beneath the semiconductor devices 12 has a similar effect (Applicant's FIGs. 6 and 7, and page 13, line 20 through page 14, line 9).

## **VI. ISSUES**

Are claims 1-3, 6, 8-11, and 13 patentable under 35 U.S.C. 102(e) over Nishizawa et al. (USP 6,323,832, hereinafter Nishizawa)?

Are claims 4 and 5 patentable under 35 U.S.C. 103(a) over Nishizawa?

Are claims 7 and 12 patentable under 35 U.S.C. 103(a) over Nishizawa and Shanks et al. (USP 5,821,688, hereinafter Shanks)?

## **VII. GROUPING OF CLAIMS**

Claims 1-15 stand or fall together.

## VIII. ARGUMENT

### *Are claims 1-3, 6, 8-11, and 13 patentable under 35 U.S.C. 102(e) over Nishizawa?*

In each of the independent claims 1 and 2, upon which all of the other claims depend, the Applicant specifically recites an array device having a matrix circuit on a substrate, wherein semiconductor devices of the matrix circuit are located in first areas of the substrate, and pixel electrodes of the matrix circuit are located in second areas of the substrate. In claim 1, the substrate is configured to flex more readily in the second areas; in claim 2, the array device is curved, and the curvature is achieved via a deformation of the substrate at the second areas.

Nishizawa teaches a display device formed by luminous elements, preferably light emitting diodes (LEDs), 1a, 2a, 3a, etc. placed on a flexible substrate. Nishizawa does not distinguish between the areas at which the semiconductor devices are located on the substrate and the areas at which the pixel electrodes are located on the substrate. Nishizawa's luminous elements 1a, 2a, 3a, etc. each include all of the components required to emit the desired light pattern for each pixel (Nishizawa's column 2, lines 50-61).

Nishizawa does not distinguish between the semiconductor devices and the pixel electrodes, if any, of the luminous elements. Nishizawa does use the term pixel electrode, and does not identify any components of the luminous elements 1a, 2a, 3a, etc. that occupy distinguishable areas from the semiconductor devices within the luminous elements 1a, 2a, 3a, etc. Thus, Nishizawa cannot be said to teach locating the semiconductor devices of the circuit in first areas and pixel electrodes of the circuit in second areas, as specifically claimed in each of the Applicant's independent claims.

Further, to facilitate bending of the display device, Nishizawa's substrate is weakened in areas that do not contain the luminous elements 1a, 2a, 3a, etc.; that is, Nishizawa's substrate is weakened in areas of the substrate that contains neither the semiconductor devices nor the pixel electrodes, if any, of the luminous elements. Nishizawa specifically teaches that only interconnecting wires are located in the areas that are weakened for bending, and the Applicant respectfully maintains that

interconnecting wires between luminous elements cannot be said to correspond to the Applicant's claimed pixel electrodes, as the term pixel electrode is used in the art, consistent with its use in the Applicant's specification.

Because Nishizawa teaches bending the substrate in areas that do not contain the luminous elements, the Applicant respectfully maintains that Nishizawa cannot be said to teach bending or curving the substrate in areas that contain pixel electrodes, as specifically claimed in the Applicant's independent claims 1 and 2.

Because Nishizawa does not teach distinguishing the areas in which semiconductor devices are located and pixel electrodes are located, and because Nishizawa does not teach configuring a substrate to curve or bend at areas in which the pixel electrodes are located, as specifically claimed in the Applicant's independent claims 1 and 2, the Applicant respectfully maintains that claims 1-3, 6, 8-11, and 13 are patentable under 35 U.S.C. 102(e) over Nishizawa.

***Are claims 4 and 5 patentable under 35 U.S.C. 103(a) over Nishizawa?***

Claims 4 and 5 are dependent upon claim 1, discussed above with regard to Nishzawa.

Because Nishizawa neither teaches nor suggests distinguishing the areas in which semiconductor devices are located and pixel electrodes are located, and because Nishizawa neither teaches nor suggests configuring a substrate to bend at areas in which the pixel electrodes are located, as specifically claimed in the Applicant's independent claim 1, upon which claims 4 and 5 depend, the Applicant respectfully maintains that claims 4 and 5 are patentable under 35 U.S.C. 103(a) over Nishizawa.

***Are claims 7 and 12 patentable under 35 U.S.C. 103(a) over  
Nishizawa and Shanks?***

Claims 7 and 12 are dependent upon claim 1, discussed above with regard to Nishzawa.

Shanks teaches a flexible display device wherein thin-film transistors and polymer light-emitting diodes are mounted on an insulating substrate that may be curved or flexible (Shanks, column 4, lines 15-18). Shanks does not specify how the substrate is

formed, and specifically does not refer to weakening the substrate in areas corresponding to pixel electrodes.

Because neither Nishizawa nor Shanks, individually or collectively, teaches or suggests distinguishing the areas in which semiconductor devices are located and pixel electrodes are located, and because neither Nishizawa nor Shanks, individually or collectively, teaches or suggests configuring a substrate to bend at areas in which the pixel electrodes are located, as specifically claimed in the Applicant's independent claim 1, upon which claims 7 and 12 depend, the Applicant respectfully maintains that claims 7 and 12 are patentable under 35 U.S.C. 103(a) over Nishizawa and Shanks.

### CONCLUSIONS

Because the prior art does not teach or suggest distinguishing the areas in which semiconductor devices are located and pixel electrodes are located, and because the prior art does not teach or suggest configuring a substrate to bend or deform at the areas where the pixel electrodes are located, the Applicant respectfully requests that the Examiner's rejection of claims 1-3, 6, 8-11, and 13 under 35 U.S.C. 102(e), and claims 4, 5, 7, and 12 under 35 U.S.C. 103(a) be reversed by the Board, and the claims be allowed to pass to issue.

Respectfully submitted,



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APPENDIX  
CLAIMS ON APPEAL

1. A flexible matrix array device comprising
  - a thin film matrix circuit carried on the surface of a flexible substrate
  - which matrix circuit includes:
    - semiconductor devices arranged in a regular array and occupying respective first areas of the substrate, and
    - pixel electrodes correspondingly coupled to each of the semiconductor devices and occupying respective second areas of the substrate;
  - wherein
  - the substrate is configured such that flexing of the substrate occurs more readily at the second areas than at the first areas.
2. A curved matrix array device comprising
  - a thin film matrix circuit carried on the surface of a substrate
  - which matrix circuit includes:
    - semiconductor devices arranged in a regular array and occupying respective first areas of the substrate, and
    - pixel electrodes correspondingly coupled to each of the semiconductor devices and occupying respective second areas of the substrate;
  - wherein
  - the substrate is configured such that curvature of the device is accommodated substantially by deformation at the substrate at the second areas.
3. A device according to Claim 1, wherein
  - the second areas comprise locally thinner regions of the substrate.
4. A device according to Claim 3, wherein
  - the locally thinner regions are formed by selective etching of the substrate.

5. A device according to Claim 3, wherein  
the substrate comprises a laminated structure with at least two layers and in which one layer is patterned to form the locally thinner regions.
6. A device according to Claim 1, wherein  
the second areas comprise areas of the substrate at which the material of the substrate is rendered less stiff compared with the first areas of the substrate.
7. A device according to Claim 1, wherein  
the substrate comprises polymer material.
8. A device according to Claim 1, wherein  
the second areas include lines that facilitate flexing of the substrate between the first areas of the substrate.
9. A device according to Claim 8, wherein  
the semiconductor devices are arranged in an array of rows and columns and wherein  
the second areas comprise lines that facilitate flexing of the substrate extending across the array between rows and/or columns of semiconductor devices.
10. A device according to Claim 1, wherein  
the first areas are thicker than the second areas of substrate.
11. A device according to claim 1, wherein  
the semiconductor devices each comprise a semiconductor film formed into an island.
12. A device according to claim 1, wherein  
the semiconductor devices comprises thin film transistors.



13. A device according to claim 1, wherein  
the device comprises  
an active matrix display devices having an array of display pixels.
14. A device according to Claim 13, wherein  
the device comprises  
an active matrix liquid crystal display device which includes  
a further flexible substrate mounted to the substrate carrying the matrix  
circuit with liquid crystal material disposed between the substrates.
15. A device according to Claim 14, wherein  
the further substrate has lines that facilitate flexing formed therein.